

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 31 JAN 2005

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2004/003799

International filing date (day/month/year)
19.11.2004

Priority date (day/month/year)
06.01.2004

International Patent Classification (IPC) or both national classification and IPC
H04L27/26, G06F17/14

Applicant
INTERNATIONAL BUSINESS MACHINES CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2004/003799

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2004/003799

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | |
| | No: Claims | 1-26 |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | 1-26 |
| Industrial applicability (IA) | Yes: Claims | 1-26 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IB2004/003799

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: E CHU ET AL: "Inside the FFT black box" [Online] 2000, CRC PRESS , BOCA RATON , XP002314648 Retrieved from the Internet:
URL:http://www.engnetbase.com/books/735/02_70_pdf_toc.pdf> [retrieved on 2005-01-24]
- D2: R MATUSIAK: "Implementing Fast Fourier Transform Algorithms of Real-Valued Sequences with the TMS320 DSP Family" TEXAS INSTRUMENTS, APPLICATION REPORT SPRA291, December 1997 (1997-12), XP002314647 Retrieved from the Internet: URL:http://www.eetkorea.com/ARTICLES/2001MAY/2001MAY07_DSP_EMS_AN.PDF> [retrieved on 2005-01-24]
- D3: EP-A2-0 668 678 (ITALTEL SOCIETA ITALIANA TELECOMUNICAZIONI S.P.A) 23 August 1995 (1995-08-23)
- D4: BOTARO HIROSAKI: "AN ORTHOGONALLY MULTIPLEXED QAM SYSTEM USING THE DISCRETE FOURIER TRANSFORM" IEEE TRANSACTIONS ON COMMUNICATIONS, IEEE INC. NEW YORK, US, vol. 29, no. 7, July 1981 (1981-07), pages 982-989, XP000568062 ISSN: 0090-6778

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-26 is not new in the sense of Article 33(2) PCT.

The invention makes use of the principle that a single N -point complex FFT can be used to evaluate two N-point real FFTs or one 2N-point real FFT (see description, page 14, paragraph before last).

This principle is well-known (see D1-D2, passages cited in the search report) and has been applied in OFDM systems (see D3-D4).

2. According to the description (see pages 2, 3) the object of the invention is to avoid two disadvantages of the prior art: (a) to avoid the imbalances of the *analogue* I/Q modulation/demodulation and (b) to avoid the increase of the sampling rate in the *digital* I/Q modulation/demodulation.

**WRITTEN OPINION OF THE
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International application No.

PCT/IB2004/003799

Similarly to the *digital* I/Q modulation/demodulation of the prior art mentioned in the description, the present application, "moves the DAC to an IF band" (see fig. 2: one DAC is used instead of the two DACs in fig. 1). However, the increase of the sampling rate is not avoided: a double clock rate (i.e. an *increased* rate) has to be used as a result of the multiplexing/de-multiplexing related to the even/odd samples and real/imaginary parts (see also description page 16, paragraph before last).

As in the prior art, the invention appears to have the same disadvantage: the $f(n)$ signal which is input to the DAC in fig. 2 is an *intermediate-frequency* signal (see claim 1; see description p. 12, first paragraph).

Therefore, contrary to the requirements of Rule 5(a)(iii) PCT the problem the invention seeks to solve cannot be understood.

Consequently, an inventive step cannot be attributed to the subject-matter of claims 1-26 (Articles 33(1) and 33(3) PCT).